The Ulster Medical Journal, Volume 64, No. 2, pp. 142 – 146, October 1995.

The epidemiology of major trauma in Northern Ireland

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Accepted 28 August 1995

SUMMARY

In a one year population based study of major trauma (Injury Severity Score greater than 15) reaching hospitals in Northern Ireland in 1990/91 the incidence was 23.2 per 100,000 of the population or 20.5 per 100,000 excluding terrorist activities.

The expected number of patients with major trauma for the province, (population 1.54 million) is 359 patients per annum. Road accidents and falls accounted for 71% of all trauma. Ninetynine patients per annum are expected to require immediate surgery, a laparotomy in 59 instances and neurosurgical procedures in 26. These data facilitate resource allocation and help predict the effects of future changes in the trauma system.

INTRODUCTION

Planning services for major trauma and plotting yearly trends in morbidity and mortality require population based data. With these objectives in mind we conducted a one year survey of major trauma in Northern Ireland.

METHODS

Twelve of the 19 hospitals that receive major trauma in Northern Ireland were chosen on a random basis to include both small, (less than 20,000 new patients per annum attending their Accident and Emergency departments) and large hospitals, and also rural and urban hospitals serving a population of approximately 1 million people. From 1/8/90 data were collected prospectively for one year on all injured patients with an Injury Severity Score (ISS) greater than 15 who reached the chosen hospitals alive. All trauma patients are brought to the nearest hospital in Northern Ireland by a free ambulance service with the universal access telephone number 999.

Recorded details included mechanism of injury, pre-hospital care and times, patient details, revised Trauma Score on arrival[1], Injury Severity Score (ISS),[2] personnel in A&E, time of arrival, time to operating theatre, resuscitative and operative management and follow-up. TRISS (the Trauma score ISS, age combination index)[3] and ASCOT (A Severity Characterization of Trauma)[4] probabilities of survival and Injury Severity Score combined, were calculated, as was the estimated annual volume and rate per 100,000 (EAV; rate) for many variables. Glasgow Outcome scores[5] at one year post injury were recorded by one of the authors (B McN) through contact with patients and general practitioners.

Annual estimates for volumes of trauma with and without terrorist activities were extrapolated from known population estimates and forensic data.

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RESULTS

Two hundred and thirty nine patients were included. The Estimated Annual Volume and rate per 100,000 of the population (EAV; rate) were 359; 23.2 whilst excluding terrorist activities the EAV; rate was 316; 20.5.

Patient demographics and mechanisms of injury are shown in tables I and II.

The reasons for emergency surgery and predicted annual volumes are shown in table III. Emergency surgery was defined as surgery for haemorrhage from an organ or vessel scoring ISS 9 or more, surgery for acute intracranial bleeding or a perforation of the gastrointestinal tract. (Examples of an ISS 9 injury include; fractured femur, small splenic tear, popliteal artery laceration). Eighteen patients died in the emergency departments including one who had surgery there.

TABLE I

Patient demographics

	number		*EAV; rate*
Age > 64	38	(16%)	57; 3.9
Age < 15	30	(13%)	45; 2.9
Age 15-64	171	(71%)	257; 16.4
Total	239	(100%)	359; 23.2

male 194 (81%) (EAV; rate 291; 18.9), female 45 (19%)
(EAV; rate 68; 4.4) m : f ratio 4.3 : 1

TABLE II

Mechanism of Injury

Mechanism of injury			*EAV; rate*	*Deaths (mortality rate %)*		*EAV; rate*
Road Traffic Accident	110	(46%)	165; 10.7	33	(30%)	50; 3.3
Falls	60	(25%)	90; 5.7	20	(33%)	30; 1.8
Gunshot	23	(10%)	35; 2.3	12	(52%)	18; 1.2
Explosions	8	(3%)	12; 0.8	2	(25%)	3; 0.2
Burns	8	(3%)	12; 0.8	1	(13%)	2; 0.1
Crush	6	(2.5%)	9; 0.6	2	(33%)	3; 0.2
Stabbing	4	(1.6%)	6; 0.4	1	(25%)	2; 0.1
Assaults	3	(1.3%)	5; 0.3	0		2; 0.1
Others	17	(8%)	26; 1.7	3	(18%)	5; 0.3
Total	239	(100%)	359; 23.2	74		114; 4.8

TABLE III

Reasons for emergency surgery

Procedure	*no. of cases*
Laparotomy	38 (EAV 59; 3.7)
Neurosurgical	17 (EAV 26; 1.5)
Thoracotomy	6 (EAV 9; 0.6)
Vascular	3 (EAV 5; 0.3)
Total	64 (EAV 99; 6.2)

TABLE IV

Some Commoner Injuries *

Diagnosis	*number (isolated*	*EAV; rate (patients)*	*Evacuated*
Extradural haematoma	15 (12)	23; 1.5	5
Acute sub-dural haematoma	18 (14)	28; 1.7	12
Intracerebral haematoma	18 (14)	28; 1.7	12
Splenic injury	11	17; 1.0	
Liver injury	7	8; 0.05	
Penetrating cardiac injury	4	6; 0.4	
Aortic injury	4	6; 0.4	
Tension pneumothorax	3	5; 0.3	

* An abbreviated list.

Haemothorax and pneumothorax are not included as many score ISS < 16 and estimates would be misleading based on ISS > 15 alone.

Some commoner injuries are shown in table IV. Eighteen patients with head injuries were not seen at tertiary referral units and 13 of them died in outlying hospitals. One hundred and thirty two patients (51%) were not transferred to the tertiary referral units, and sixty of these died. Glasgow outcome scores at one year for patients AIS >3 are shown in table V.

TABLE V

Glasgow Outcome Scores at one year post injury for 113 head injuries ISS > 9.

Outcome	*Number (per cent)*	*EAV; rate*
Death	49 (45)	75; 5
Persistent vegetative state	0 (0)	0; 0
Severe disability	1 (.9)	2; 0.1
Moderate disability	11 (10)	17; 1.1
Good recovery	50 (45)	75; 1.1
Total *	111 (100)	

* two patients lost to follow-up

DISCUSSION

The epidemiology of major trauma reaching hospital has been mapped in Northern Ireland. This study provides a basis for quality assurance in the future, plots the first point on the hospital mortality graph and provides data for accurate planning of trauma services. It may also be used for inter-regional and international comparisons.

The data may be used for quality assurance by being able to differentiate a change in hospital mortality due to better medical care from a change due to variation in the volume and pattern of injury. For example if compliance with seat-belt and drink-driving laws were to deteriorate, a rise in hospital and pre-hospital deaths would be expected. This might be wrongly attributed to a fall in standards of hospital care. Analysis of the hospital deaths by ISS however, should then show that the volume and severity of major trauma had increased, whilst no change, or even a fall in the relative mortality rates might have occurred.

This method of analysis will also permit evaluation of the effects of better paramedical care (where a rise in the volume and severity of trauma reaching hospital could be expected), or better injury prevention (a fall in total volume and severity of injury).

Figures for blunt trauma published here while specific to Northern Ireland should approximate to those expected in the remainder of the United Kingdom, as figures for the Merseyside study[6] and for the North Staffordshire region[7] are similar. The mortality rates for injury in Northern Ireland are in the higher range for the United Kingdom.[8] Details of preventable deaths and resuscitation are published elsewhere.[9]

This study does not provide data on the large numbers of disabling, mainly orthopaedic injuries, as these often score less than 16 on the ISS. (The ISS is designed more to measure threat to life than disability). It does however include almost all potentially life-threatening injuries.

There is less major trauma than predicted by the American College of Surgeons estimates,[10] and based on annual mortality statistics[8] this number of injured patients will continue to fall. We predict that it will become increasingly difficult for any one surgeon to see the fifty major trauma cases per annum recommended to attain or maintain their skills.[10]

ACKNOWLEDGEMENTS

Our thanks to the Department of Health for funding, and the Forensic Pathologists for their assistance. All the participating hospitals (who wish to remain anonymous) gave their assistance voluntarily and to them we are most grateful. Our sincere thanks to all who helped us in the departments of Accident and Emergency, Surgery and Intensive Care.

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